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PORTABLE BALLOON LAUNCHER SYSTEM

Field of the Invention

This invention relates to balloon launched instrumentation and to a system for simplifying the deployment of the balloon that carries the instrumentation aloft.

Problem

It is a problem in the field of instrumentation to accurately make measurements of atmospheric conditions in a cost effective manner. There are numerous measurements of atmospheric conditions that are taken on a regular basis and these include air temperature, humidity, air pressure, wind direction, and wind velocity as the most common measurements. The systems used to take these measurements can be divided into two general classifications: terrestrial operations, and airborne operations. In the airborne operations, an airplane passes over the site at which the measurements are to be taken and releases an instrument package, which is carried by parachute to the ground. This aircraft released instrument package is called a dropsonde. In the terrestrial operations, the instrument package is carried aloft by a balloon from a fixed launch site, such as an airport. The balloon expands as the altitude increases and eventually bursts. Once the balloon bursts, the instrument package is released and a parachute is deployed to provide a controlled descent of the instrument package back to the ground.

It is a problem in terrestrial operations to deploy the balloon launched instrumentation in a hostile environment. The balloon must be inflated with a lighter than air gas, such as helium. The balloon, once fully inflated is connected via a tether line to the instrument package. The instrumentation is activated and the balloon released to carry the attached instrumentation aloft to perform its designated measurements of meteorological phenomena. The launching of instrumentation balloons can be accomplished at a fixed site, using an enclosed work space to facilitate the launch process. However, the number of fixed sites is limited and the cost of equipping such a site with a building dedicated to balloon launches renders this solution impractical for most balloon launch sites. The vast majority of balloon

launches of instrumentation occur in an open air environment and typically require a number of individuals to inflate the balloon and hold the balloon while the instrumentation is attached. These open air launches are particularly difficult on board ships due to high winds, tight overhead clearances, and the inability to find a protected location or change the launch site to match wind shifts. There is presently no system to simplify this process of launching instrumentation balloons in an open air environment.

Solution

The above described problems are solved and a technical advance achieved by the present portable balloon launcher system that functions to provide apparatus that facilitates the inflation and launch of the balloon. The portable balloon launcher system consists of a case that is equipped with a set of legs that fold out from the back of the case. The case is then opened and folding panels located therein extended to create a substantially rectangular launch platform, oriented in a substantially horizontal plane. An integral launch bag is connected to the resultant portable and stable launch platform. The uninflated balloon is inserted into this launch bag, attached to a tank of helium, and inflated.

Once the instrumentation is attached to the balloon and the balloon is ready to launch, the launch bag is opened and the balloon released. This permits trouble free launching of the instruments since the launch bag secures the balloon to the case until it is ready to launch. The setup is simple since all of the elements are formed in an integral structure and this structure also functions as a carrying case to transport the instrumentation and uninflated balloon in the protected confines of the case. This reduces setup time and avoids the difficulties involved in existing launch configurations.

Brief Description of the Drawings

Figure 1 illustrates, in perspective view, the present portable balloon launcher system;

Figure 2 illustrates, in perspective view, the present portable balloon launcher system with the legs extended;

Figure 3 illustrates, in perspective view, the present portable balloon launcher

system with the deployable panels extended;

Figure 4 illustrates, in perspective view, the present portable balloon launcher system with the deployable panels extended and the balloon bag mounted thereon;

Figure 5 illustrates, in perspective view, the present portable balloon launcher system with the inflated balloon inserted in the balloon bag;

Figure 6 illustrates, in perspective view, the present portable balloon launcher system with the end of the balloon attached to the tether line; and

Figure 7 illustrates in flow diagram form the steps taken to operate the present portable balloon launcher system.

Detailed Description of the Drawings

Figures 1-6 illustrate, in perspective view, the present portable balloon launcher system in various stages of the launch process, while Figure 7 illustrates in flow diagram form the steps taken to operate the present portable balloon launcher system. The portable balloon launcher system consists of a case that is equipped with a set of legs that fold out from the back of the case. The case is then opened and folding panels located therein extended to create a substantially rectangular launch platform, oriented in a substantially horizontal plane. An integral launch bag is connected to the resultant portable and stable launch platform. The uninflated balloon is inserted into this launch bag, attached to a tank of helium, and inflated. Once the balloon is ready to launch, the launch bag is opened and the balloon released.

The outer case 101 of the balloon launcher 100 is formed of a lightweight but tough plastic. The case 101 is substantially rectangular in shape and resembles a large suitcase that consists of a body 101A and a cover 101B that is attached to the body by a set of hinges. Optional wheels 102A, 102B and handle 113 mounted in the frame 114 of the case 101 permit the user to simply transport the portable balloon launcher 100. The portable balloon launcher 100 is deployed at step 701 by folding a set of legs 104A, 104B out from the back of the body 101A, latching supports 104D - G locking legs 104A, 104B in place. In addition, leg 104C is removed from clips inside case 101 and inserted in a socket formed in cover 101B for deployment. Fittings 105 are optionally provided to enable the user at step 702 to secure the case 101 to a solid

structure located at the launch site, such as a ship's rail. The fittings 105 can also be used for lifting case 101. When the case 101 is opened, as shown in Figure 3, at step 703 panels 106, 107 are extended and locked in place to create a substantially rectangular launch platform, oriented in a substantially horizontal plane. The legs 104A-104C are sized to provide structural stability to the deployed launch platform and to position the launch platform at a height that is ergonomically correct for implementing the launch process. The one panel 107 that extends beyond the end of the bag 109 is designed to have an integrated sonde holder/sensor ventilation unit 103 attached to it.

The case 101 can be used to store and transport uninflated balloon(s) 108 and/or instrumentation, such as sonde(s) 111. The case 101 therefore provides not only the launch platform, but also is the transport element that carries the balloons, sondes and ancillary items in a protected manner to the launch site. The launch bag 108 is removed at step 704 from the case 101 and secured to the extended panels 106, 107 at step 705. The method of attachment can be via lengths of Velcro attached to the launch bag 108 that interconnect with mating Velcro strips 121-124 secured to the panels 106, 107, or some other method of attachment. The top half of the launch bag 108 is manufactured from an elastic material, such as expandable Lycra, which serves to cradle the balloon 109 more securely. The bottom half of the launch bag 108 is formed of heavy gauge vinyl coated fabric. The launch bag 108 is typically formed in a substantially cylindrical shape, sized to hold the balloon 109 securely within the cylinder from the range of balloon inflation from uninflated to fully inflated.

An un-inflated latex balloon 109 is inserted into one end of the launch bag 108 at step 706. The end of the balloon 109 is attached at step 707 to a source of compressed gas 110, such as a cylinder of helium. As the balloon 109 inflates, the launch bag 108 prevents the balloon 109 from rising and pulling on its tether. This enables the user to secure the sonde 111 to the balloon line 112 without struggling to control the balloon 109. When the balloon 109 is fully inflated, it is tied off at step 708 and the sonde 111 is tied to the balloon 109 at step 709. To launch the balloon 109, a zipper 115, which runs the length of the launch bag 108 is opened, thereby releasing

the balloon 109 at step 710.

Summary

The portable balloon launcher system consists of a case that is equipped with a set of legs that fold out from the back of the case. The case is then opened and folding panels located therein extended to create a substantially rectangular launch platform, oriented in a substantially horizontal plane. An integral launch bag is connected to the resultant portable and stable launch platform. The uninflated balloon is inserted into this launch bag, attached to a tank of helium, and inflated. Once the instrumentation is attached to the balloon and the balloon is ready to launch, the launch bag is opened and the balloon released.